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(19)

(54) AN IMPROVEMENT IN OR RELATING TO TAPPING ATTACHMENTS

(71) We, FRANK GUYLEE & SON LIMITED, a British Company, of Archer Tool Works, Archer Road, Sheffield 8, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to tapping attachments and has for its object to provide an improvement therein.

Tapping attachments are often provided with adjustable means whereby an overload release can be brought about dependent upon the size of tapping bit being used. Consequently, during normal conditions, a drive is transmitted from the attachment to the tapping bit, but when the bit meets with a sudden overload, such as when it reaches the bottom of a blind hole or meets with hard spots or impurities in the metal workpiece, the overload release comes into action and prevents the full available driving torque being imparted to the tap, so reducing the tendency for the tapping bit to be broken. Such tapping attachment generally work quite well and can be adjusted to give consistently good results. However, there is the danger that when changing the size of tapping bit being used, particularly if changing to a smaller size of bit, an operator may be inadvertence or otherwise fail to adjust the driving torque at which overload release will occur, with a consequent risk of breaking the tapping bit.

According to the invention, a tapping attachment is provided with means whereby an overload release is brought about at a particular torque, said means including driving and driven elements, disengageable means for establishing a driving connection between the two, resilient means which must be overcome to allow the disengagement of said disengageable means, and a distance piece for determining the torque at which said resilient means will be overcome, said distance piece being associated with or formed integrally with a holder for a particular size of tapping bit. Preferably, with the attachment there will be provided a plurality of distance pieces associated with respective holders for different sizes of tapping bits, for selective fitment to the attachment for determining the torque at which the resilient means will be overcome in accordance with the size of tapping bit selected for use. The resilient means will preferably be constituted by spring means, conveniently by a plurality of Bellville (Registered Trade Mark) spring washers. The driving connection between the driving and driven elements will preferably include steel balls capable of "riding" out of depressions in one or the other of said elements at the particular set torque. The attachment will preferably have means providing a degree of axial "float" and such means may be provided in a part of the attachment axially spaced from the means providing overload release so that the maximum diameter of the attachment is kept as small as possible. Means providing a degree of radial "float" could also be provided.

In order that the invention may be fully understood and readily carried into effect, the same will now be described, by way of example only, with reference to the drawings accompanying the Provisional Specification, of which:—

Fig. 1 is a view partly in longitudinal section through a tapping attachment embodying the invention, and

Fig. 2 is a view of a component part thereof which will presently be referred to.

Referring now to the drawings, a tapping attachment is formed in two main sections connected together axially, that is to say, an upper section generally indicated 10 for providing a degree of axial "float" (and shown in the drawing to be provided with a Morse (Registered Trade Mark) taper shank 12 for fitment to a machine tool driving spindle) and a lower section generally indicated 14 for effecting overload release at a particular driving torque. Since the present invention is con-

cerned purely with the overload release means, the lower section only is shown in section.

The lower section 14 includes a driving member 16 and driven member 18 and resilient means constituted by a plurality of Bellville (Register Trade Mark) spring washers 20 are provided to establish a driving connection between the two through a plurality of steel balls 22 located in equally spaced depressions in an end face of the driving member and in similarly spaced apertures in the driven member, the arrangement being such that said balls can ride out of said depressions at a particular set torque to allow the driving and the driven elements to rotate freely with respect to each other. A driving sleeve 24 which surrounds the driven member and the Bellville spring washers beneath it is rotatable with respect to the driving member but is rotatably fixed with respect to the driven member by means of five equally spaced steel balls 26 which are captive in respective depressions at the periphery of the latter and which are located in similarly spaced axially extending slots 28 within the sleeve. The sleeve is axially fixed with respect to the driving member 16 by means of a plurality of steel balls 15 which engage a circumferential track 17 around said driving member and which are located in respective holes 19 in the wall of said sleeve.

A collet generally indicated 30 is located in the lower end of the driving sleeve 24 for the reception of a tapping bit (not shown). The collet includes a body part 32 and a sleeve part 34 which is slidably located in a recess 36 at the lower end of said body part. A light coil spring 38 within the recess 36 acts against the sleeve part to urge it outwardly of the body but three equally spaced steel balls 40 (only one of which is shown in Fig. 1) which are captive in tapering holes in the sleeve part act against an inwardly flared end portion 42 of the recess and the extent of outward movement of the sleeve part is restricted by the balls "bottoming" in said tapering holes. The balls 40 perform a similar function when a tapping bit is held by the collet with its shank located in the sleeve part 34 and its square tang part drivably engaged with a square shaped aperture 44 in the body part 32, wedging contact between the balls and the shank of the bit ensure that the bit can only be removed if the sleeve part 34 is initially moved upwards against the action of the spring 38.

The collet body is itself retained in the driving sleeve 24 by three equally spaced steel balls 46 which are located in tapering holes in said sleeve and engage depressions 48 formed at the periphery of the collet body. A collet ball retainer in the form of a cylindrical sleeve 50 is slidably mounted on the driving sleeve 24 and serves not only to retain the balls 46 in the depressions 48 but also to retain the balls 15 in the holes 19 and to retain the balls 26 in the slots 28. A coil spring 52 acts to urge the collet ball retainer into the position in which it is shown in Fig. 1, that is to say, into abutment with a circlip 54 retained in a groove in the driving sleeve 24, but when it is desired to remove the collet the collet ball retainer can be displaced away from said circlip to allow the balls 46 to move radially outwards sufficient to ride out of the depressions 48. The collet body is then free to slide out of the driving sleeve. A knurled collar 31 is provided on the body part of the collet to facilitate collet changing. The size of tapping bit for which it is intended is marked on the exposed face of said collar.

It will be seen that the axial position of the collet body part 32 in the driving sleeve 24 is determined by the steel balls 46 locating in the depressions 48 in said sleeve. When in position in said driving sleeve, the end of the collet body part which projects into the sleeve abuts against a setting disc 56 which in turn acts against the Bellville (Registered Trade Mark) spring washers 20. Consequently, the degree by which said spring washers require to be compressed to allow the steel balls 22 to ride out of the depressions in the end face of the driving member, and thus the maximum torque which can be transmitted from the driving member to the driven member, is dependent on the distance *d* (shown in Fig. 2) of the collet body part, being the distance from a plane containing the depressions 48 to the end face 58 remote from the sleeve part (since it will be understood that until a torque is transmitted between the driving and driven members, the balls 22 are quite loosely located in the spaces provided by the depressions in the driving member and the similarly spaced apertures in the driven member; in other words, the distance *d* determines the distance through which the steel balls have to climb and through which they must overcome the spring washers, to disengage themselves from the depressions in the driving member). When the collet has been removed from the attachment a light spring 60 acts to hold the setting disc against an internal shoulder 62 within the driving sleeve.

It will thus be understood that it is a simple matter for a plurality of special collets to be provided each for receiving a particular size of tapping bit, the body parts of which each have a dimension *d* appropriate to that particular size of bit, that is to say, each collet body in effect having a distance piece formed integrally with it for positioning the Bellville (Registered Trade Mark) spring washers so that they must be compressed, to release the balls 22 from the depressions in the driving member, to a degree appropriate to the maximum torque to which

the tapping bit in question can safely be subjected. Consequently, an operator does not need to spend time re-adjusting the driving torque at which overload release will occur whenever he changes the size of drill bit which he is to use, and in fact does not even need to think about it because the re-adjustment is carried out automatically as he fits the new size of collet required.

Various modifications may be made without departing from the scope of the invention. For example, the resilient means need not necessarily be constituted by Bellville (Registered Trade Mark) spring washers; a coil compression spring could perhaps be used instead. It will also be understood that the attachment need not necessarily be provided with means for providing a degree of axial float although when provided in a separate section as in the case of the attachment illustrated, a very slim construction is possible. The attachment could be provided with means for permitting a degree of radial "float". The attachment may of course be provided with any required form of driving spindle, not necessarily a taper shank.

WHAT WE CLAIM IS:—

1. A tapping attachment provided with means whereby an overload release is brought about at a particular torque, said means including driving and driven elements, disengageable means for establishing a driving connection between the two, resilient means which must be overcome to allow the disengagement of said disengageable means, and a distance piece for determining the torque at which said resilient means will be overcome, said distance piece being associated with or formed integrally with a holder for a particular size of tapping bit.

2. A tapping attachment according to claim 1, and a plurality of distance pieces, associated with respective holders for different sizes of tapping bits, provided for selective fitment to the attachment for determining the torque at which the resilient means will be overcome in accordance with the size of tapping bit selected for use.

3. A tapping attachment according to either one of the preceding claims, in which the resilient means are constituted by spring means.

4. A tapping attachment according to claim 3, in which the spring means are constituted by a plurality of Bellville spring washers.

5. A tapping attachment according to any one of the preceding calims, in which the driving connection between the driving and driven elements includes steel balls capable of "riding" out of depressions in one or the other of said elements at the particular set torque.

6. A tapping attachment according to any one of the preceding claims, in which the attachment has means providing a degree of axial "float" such means being provided in a part of the attachment axially spaced from the means providing overload release so that the maximum diameter of the attachment is kept as small as possible.

7. A tapping attachment according to any one of the preceding claims, in which means providing a degree of radial "float" are also provided.

8. A tapping attachment constructed, arranged and adapted to operate substantially as hereinbefore described with reference to and as illustrated by the drawings accompanying the Provisional Specification.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

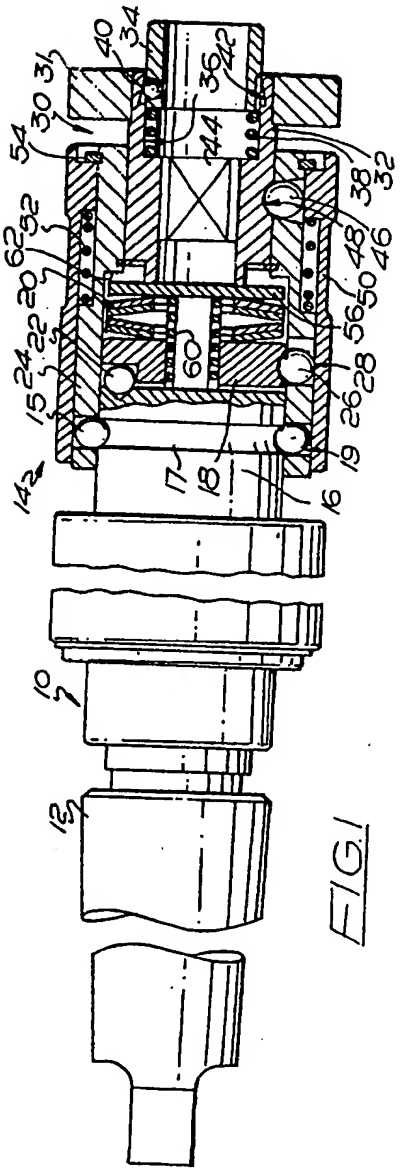

FIG.1

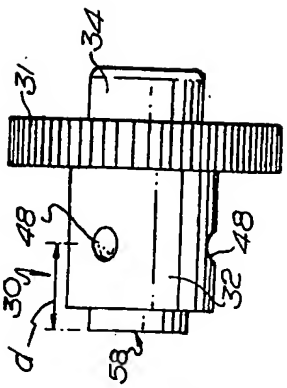

FIG.2